BEARD OIL COMPANY
GEMINI DIVISION

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October 29, 1990

Bill Linenberger
USGS Core Research Center
Denver Federal Center
Building #810
Denver, CO 80225

D-685
AMOCO PROD Co

RE: Sleepy Hollow Lansing Unit
Well #389
NE SW Sec. 3-2N-27W
Red Willow County, Nebraska

Dear Mr. Linenberger:

On June 11, 1990, our representative obtained small pieces of Reagan Sand core from the subject well to deliver to Surtek for alkaline consumption testing. At that time you requested a copy of the laboratory test results.

Attached is a copy of Surtek's letter of July 2, 1990, presenting the results of their work.

Very truly yours,

BEARD OIL COMPANY
Gemini Division

Michael E. Carr
President

MEC:pjg

Attachment

SURTEK

1511 Washington Avenue — Golden, Colorado 80401 — [303] 278-0877 — FAX: [303] 278-2245

July 2, 1990

Mr. Mike Carr
BEARD OIL COMPANY
P.O. Box 309
McCook, NE 69001

Dear Mike:

Table 1 lists the consumption of sodium carbonate by the Reagan sand core plugs from four wells in the Sleepy Hollow Field. The consumption was very low, indicating that the consumption observed in the previous studies was due to the magnetic particles mixed with the sand.

The amount of consumption in Table 1 corresponds to about 1 lb/acre-ft $Na_2CO_3$ consumption. A value which is very low and indicates that injection of sodium carbonate into the Reagan sand of the Sleepy Hollow Field will not be a problem.

If you have any questions about the static consumption studies, please feel free to call either Harry or me. Please let us know your desires about any future evaluations in the Sleepy Hollow, Reagan Sand.

Sincerely,

Malcolm J. Pitts, Ph.D.
Director - Petroleum Technology

cc: Bob Magnie

Table 1
SURTEK, INC.

Adsorption of $Na_2CO_3$ onto Sleepy Hollow Reagan Sand

| | | Days of Contact | | | | |
|---|---|---|---|---|---|---|
| | | 0 | 1 | 3 | 7 | MAXIMUM |
| WELL | DEPTH (FT) | mg $Na_2CO_3$ neutralized/gram of Reagan Sand | | | | POSSIBLE |
| Stritt 10-8 | 3540-41 | 0.00 | 0.81 | 0.56 | 0.43 | 49.96 |
| | 3548-49 | 0.00 | 0.00 | 0.00 | 0.00 | 49.94 |
| | 3543-44 | 0.00 | 0.00 | 0.00 | 0.00 | 49.96 |
| Stritt 3-15 | 3557-58 SCAL 6146 | 0.00 | 0.04 | 0.60 | 0.60 | 49.76 |
| | core 6 | 0.00 | 0.56 | 0.80 | 0.80 | 50.40 |
| | core 7 | 0.00 | 0.36 | 0.40 | 0.40 | 49.94 |
| | core 8 | 0.00 | 0.00 | 0.96 | 0.24 | 49.76 |
| | core 9 | 0.00 | 2.00 | 2.04 | 0.48 | 49.90 |
| Barber 3-B | 3410-11 | 0.00 | 1.08 | 1.03 | 1.03 | 50.00 |
| Midwest #1A Fritz | 3500 | 0.00 | 1.92 | 2.84 | 1.44 | 49.84 |
| D-685 #389 Amoco | 3482, 3489, 3487, 3489 composite | 0.00 | 0.84 | 0.44 | 0.44 | 49.92 |

100 grams of 1.25 wt% $Na_2CO_3$ dissolved in tap water was mixed with 25 grams of crushed, extracted Reagan sand for the static consumption studies. Samples were incubated at 89°F for the designated time. $Na_2CO_3$ concentration of the aqueous phase was determined by titration with 0.0202N HCl to the phenolphthalein end point. The concentration of $Na_2CO_3$ in the aqueous phase 1.225 wt% is when the consumption value is 1 mg/g of sand.